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09/932,261	08/17/2001	Cornelius Van Rensburg	47586/P067US/10106269	3117

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EXAMINER	
GANTT, ALAN T	

ART UNIT	PAPER NUMBER
2684	8

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/932,261	Applicant(s) RENSBURG ET AL.	
	Examiner Alan T. Gantt	Art Unit 2684	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *44 and 45* is/are allowed.

6)☒ Claim(s) *1-5,10-23 and 33-39* is/are rejected.

7)☐ Claim(s) *6-9,24-32 and 40-43* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the rest of the claim limitation. The limitation is incomplete.

Claim Objections

Claim 36 is objected to because of the following informalities: a phrase from the next claim appears after the period. The examination was performed assuming that the limitation ended after the first period. The subsequent phrase was discarded. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, 5, 10-23, and 33-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwahara et al., in view of Forssen et al.

Regarding claim 1, Kuwahara discloses a radio communication system using an adaptive array antenna that estimates an array weight for the downlink. Kuwahara provides for an optimized downlink array weight estimation on the basis of an array response vector obtained from a signal subspace and an interference subspace (col. 3, lines 13-50). Kuwahara is silent regarding the estimating of the speed of the subscriber unit. However, since Kuwahara is tracking both the desired subscriber unit and seeking to provide nulls in the direction of interferers. Kuwahara notes that the directions of signals from the desired unit is noted and obviously for the return or downlink signal to be optimum for the moving desired unit, Kuwahara would have to utilize some aspect or component of the direction information from the uplink signal to represent speed. Thus, Kuwahara suggests the following limitation:

> a speed estimator providing speed information with respect to a subscriber unit using corresponding array response vector information determined from a reverse link; (col. 4, line 65 to col. 5, line 4 and col. 6, lines 27-63)

Kuwahara allows for forming a beam but is silent regarding selecting a beam configuration.

Forssen discloses an antenna assembly that selects and forms an antenna beam pattern that exhibits high carrier-to-noise and carrier-to-interference ratios. Forssen utilizes a direction of arrival determiner. Forssen meets the limitation:

> a beam selector providing selection of a beam configuration for use in a communication link with respect to said subscriber unit from a plurality of beam configurations using said speed information. (col. 3, lines 23-54 and Figure 7, refs. 92

and 94 –the direction of arrival determines will provide input to the beam configuration determiner that relates to the movement of the desired unit and the speed determination will provide the proper return beam)

Kuwahara and Forssen are combinable because they share a common endeavor, namely bas station having smart antenna technology. At the time of the applicant's invention it would have been obvious to modify Kuwahara to make appropriate antenna beam selections as done by Forssen to allow for the optimized signal to track the desired unit and avoid interferers.

Regarding claim 2, Kuwahara meets the limitation - The system of claim 1, further comprising: a signal integrator providing said array response vector information. (Figure 4, refs. 108 and 106 - this is required of systems using array antenna to get the complete information of the signal)

Regarding claim 4, the examiner takes Official Notice that it is well known that for in WCDMA systems a unique pilot signal is sent by the desired unit with its desired signal and that it would have been obvious to modify the Kuwahara / Forssen combination to include such to better correlate the received signal.

Regarding claim 5, Kuwahara meets the limitation - The system of claim 3, wherein said signal integration circuitry integrates a uniquely coded signal of said subscriber unit to provide an array response vector of said array response vector information. (col. 2, lines 1-41 [since

Kuwahara relates to a CDMA system, the signal will have a unique code that is despread when received at the base station which helps in forming the downlink signal])

Regarding claim 10, The examiner takes Official Notice that it is well known that a speed estimator determines speed as a function of Rayleigh fading estimations and that it would have been obvious for Kuwahara to utilize such estimations to perform speed estimations as such fading information is indicated in the uplink signal.

Regarding claims 11 and 12, The examiner takes Official Notice that it is well known to determine a fading estimation by using a difference between a first array response vector of said array response vector information and a second array response vector of said array response vector information and that it would have been obvious for Kuwahara as a snapshot at one instant will yield values and a snapshot at a second instant will yield differences that suggest fading if the second instant is less than the first instant.

Regarding claims 13 and 14, Kuwahara contains both forward and reverse links. (Abstract)

Regarding claim 15, Kuwahara discloses a radio communication system using an adaptive array antenna that estimates an array weight for the downlink. Kuwahara provides for an optimized downlink array weight estimation on the basis of an array response vector obtained from a signal subspace and an interference subspace (col. 3, lines 13-50). Kuwahara is silent

regarding the estimating of the speed of the subscriber unit. However, since Kuwahara is tracking both the desired subscriber unit and seeking to provide nulls in the direction of interferers. Kuwahara notes that the directions of signals from the desired unit is noted and obviously for the return or downlink signal to be optimum for the moving desired unit, Kuwahara would have to utilize some aspect or component of the direction information from the uplink signal to represent speed. Thus, Kuwahara suggests the following limitation:

A system for selecting an optimum wireless link beam configuration, said system comprising:

speed estimation circuitry providing speed information with respect to a subscriber unit, wherein said speed information is determined by said speed estimation circuitry using array response vector information of a signal from said subscriber unit as received by an antenna array; (col. 4, line 65 to col. 5, line 4 and col. 6, lines 27-63)

Kuwahara allows for forming a beam but is silent regarding selecting a beam configuration.

Forssen discloses an antenna assembly that selects and forms an antenna beam pattern that exhibits high carrier-to-noise and carrier-to-interference ratios. Forssen utilizes a direction of arrival determiner. Forssen meets the limitation:

beam analyzer circuitry providing beam merit information with respect to said subscriber unit for a plurality of beam configurations, wherein said beam merit information is determined by said beam analyzer circuitry using said array response vector information; (col. 3, lines 23-54 and Figure 7, refs. 92 and 94 –the direction of arrival determines will provide input to the beam configuration determiner that relates to the movement of the desired unit and the speed determination will provide the proper

return beam. The beam merit aspect is meet by col. 7, lines 21-29 [i.e., if the selected configuration is not good enough, form a null])

and

Beam-mapping circuitry providing selection of an optimum beam with respect to said subscriber unit using said beam merit information and said speed information. (Figure 7, col. 6, line 66 to col. 7, line 57 – Forssen is utilizing information from the received signal to produce a beam headed back to the desired unit)

Kuwahara and Forssen are combinable because they share a common endeavor, namely bas station having smart antenna technology. At the time of the applicant's invention it would have been obvious to modify Kuwahara to make appropriate antenna beam selections as done by Forssen to allow for the optimized signal to track the desired unit and avoid interferers.

Regarding claim 16, Kuwahara meets the limitation - The system of claim 15, further comprising signal integration circuitry providing said array response vector information. (Figure 4, refs. 108 and 106 - this is required of systems using array antenna to get the complete information of the signal)

Regarding claim 17, the examiner takes Official Notice that it is well known that for in WCDMA systems a unique pilot signal is sent by the desired unit with its desired signal and that it would have been obvious to modify the Kuwahara / Forssen combination to include such to better correlate the received signal.

Regarding claim 18, Kuwahara meets the limitation - The system of claim 16, wherein said signal integration circuitry integrates a uniquely coded signal of said subscriber unit to provide an array response vector of said array response vector information. (col. 2, lines 1-41 [since Kuwahara relates to a CDMA system, the signal will have a unique code that is despread when received at the base station which helps in forming the downlink signal])

Regarding claim 19, The examiner takes Official Notice that it is well known that a speed estimator determines speed as a function of Rayleigh fading estimations and that it would have been obvious for Kuwahara to utilize such estimations to perform speed estimations as such fading information is indicated in the uplink signal.

Regarding claim 20, The examiner takes Official Notice that it is well known to determine a fading estimation by using a difference between a first array response vector of said array response vector information and a second array response vector of said array response vector information and that it would have been obvious for Kuwahara as a snapshot at one instant will yield values and a snapshot at a second instant will yield differences that suggest fading if the second instant is less than the first instant and the circuit function of the claim is obvious.

Regarding claims 21 and 22, The examiner takes Official Notice that it is well known to determine a fading estimation by using a different time intervals or sampling times between a

first array response vector of said array response vector information and a second array response vector of said array response vector information and that it would have been obvious for Kuwahara to utilized different intervals as a matter of design choice.

Regarding claim 23, the examiner takes Official Notice that aging filters that average values over time is well known in the art and that it would have been obvious to modify Kuwahara to utilize aging filters to average out speed estimates between samplings.

Regarding claim 33, Kuwahara discloses a radio communication system using an adaptive array antenna that estimates an array weight for the downlink. Kuwahara provides for an optimized downlink array weight estimation on the basis of an array response vector obtained from a signal subspace and an interference subspace (col. 3, lines 13-50). Kuwahara is silent regarding the estimating of the speed of the subscriber unit. However, since Kuwahara is tracking both the desired subscriber unit and seeking to provide nulls in the direction of interferers. Kuwahara notes that the directions of signals from the desired unit is noted and obviously for the return or downlink signal to be optimum for the moving desired unit, Kuwahara would have to utilize some aspect or component of the direction information from the uplink signal to represent speed. Thus, Kuwahara suggests a method for selecting an optimum wireless link beam configuration, and suggests or meets the following limitation:

> estimating subscriber unit speed to thereby provide speed information, wherein said speed information is estimated using array response vector information of a signal

from said subscriber unit as received by an antenna array; (col. 4, line 65 to col. 5, line 4 and col. 6, lines 27-63)

Kuwahara allows for forming a beam but is silent regarding selecting a beam configuration.

Forssen discloses an antenna assembly that selects and forms an antenna beam pattern that exhibits high carrier-to-noise and carrier-to-interference ratios. Forssen utilizes a direction of arrival determiner. Forssen meets the limitation:

analyzing a plurality of beam configurations with respect to said subscriber unit to thereby provide beam merit information, wherein said beam merit information is analyzed using said array response vector information; (col. 3, lines 23-54 and Figure 7, refs. 92 and 94 –the direction of arrival determines will provide input to the beam configuration determiner that relates to the movement of the desired unit and the speed determination will provide the proper return beam. The beam merit aspect is meet by col. 7, lines 21-29 [i.e., if the selected configuration is not good enough, form a null]) and

mapping said beam merit information to a selected optimum beam configuration as a function of said speed information. (Figure 7, col. 6, line 66 to col. 7, line 57 – Forssen is utilizing information from the received signal to produce a beam headed back to the desired unit)

Kuwahara and Forssen are combinable because they share a common endeavor, namely bas station having smart antenna technology. At the time of the applicant's invention it would

have been obvious to modify Kuwahara to make appropriate antenna beam selections as done by Forssen to allow for the optimized signal to track the desired unit and avoid interferers.

Regarding claim 34, Kuwahara meets the limitation - The method of claim 33, further comprising: integrating said signal from said subscriber unit to provide said array response vector information. (Figure 4, refs. 108 and 106 - this is required of systems using array antenna to get the complete information of the signal)

Regarding claim 35, the examiner takes Official Notice that it is well known that for in WCDMA systems a unique pilot signal is sent by the desired unit with its desired signal and that it would have been obvious to modify the Kuwahara / Forssen combination to include such to better correlate the received signal.

Regarding claim 36, Kuwahara meets the limitation - The method of claim 34, wherein said signal integrated comprises a uniquely coded signal of said subscriber unit. (col. 2, lines 1-41 [since Kuwahara relates to a CDMA system, the signal will have a unique code that is despread when received at the base station which helps in forming the downlink signal])

Regarding claim 37, The examiner takes Official Notice that it is well known that a speed estimator determines speed as a function of Rayleigh fading estimations and that it would have

been obvious for Kuwahara to utilize such estimations to perform speed estimations as such fading information is indicated in the uplink signal.

Regarding claims 38 and 39, The examiner takes Official Notice that it is well known to determine a fading estimation by using a difference between a first array response vector of said array response vector information and a second array response vector of said array response vector information and that it would have been obvious for Kuwahara as a snapshot at one instant will yield values and a snapshot at a second instant will yield differences that suggest fading if the second instant is less than the first instant.

Allowable Subject Matter

Claims 44 and 45 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 44, a system for selecting an optimum wireless link beam configuration having the precise couplings of the components of the claim was neither found, suggested, nor made evident by the prior art.

Claims 6-9, 24-32, and 40-43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 6, a beam configuration analyzer providing beam merit information for a plurality of beam configurations using array response vector information and weighting this beam merit information by a beam selector using speed information for selection of the beam configuration was neither found, suggested, nor made evident by the prior art.

Regarding claim 24, the use of regressive coefficient multipliers for providing correction of speed estimation values with respect to actual speed values were neither found, suggested, nor made evident by the prior art.

Regarding claims 25 and 40, array response vector decimation circuitry that decimates array response vector information prior to use by the beam analyzer circuitry was neither found, suggested, nor made evident by the prior art.

Regarding claims 28 and 42, beam analyzer circuitry comprising a narrow beam forming circuit, a reference beam forming circuit and a beam correlation calculating circuit (with all having the characteristics of the claim) was neither found, suggested, nor made evident by the prior art.

Regarding claim 31, a beam mapping circuit having weighting information associated with beam configurations for weighting corresponding beam merit information for selection of an optimum beam was neither found, suggested, nor made evident by the prior art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Xiao et al. discloses a method for estimating the speed of a mobile using Rayleigh fading.

Marsan et al discloses an adaptive determination of outbound channel quality metrics.

Any inquiry concerning this communication from the examiner should be addressed to Alan Gantt at telephone number (703) 305-0077. The examiner can normally be reached between 9:30 AM and 6 PM within the Eastern Time Zone. The group FAX number is (703) 872-9306.

Any inquiry of a general nature or relating to this application should be directed to the group receptionist at telephone number (703) 305-4700.

Alan T. Gantt

Alan T. Gantt

August 21, 2004

NICK CORSARO
PRIMARY EXAMINER